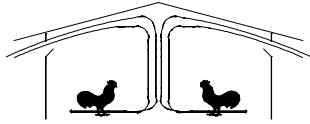




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Poultry Housing Tips

House Tightness, Environmental Control and Energy Usage

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The more control producers have over air temperature, air quality and energy usage, the more control they will have over their paycheck at the end of the growout. In order to control air temperature, air quality, and energy usage, it is crucial to control how much fresh air enters the house as well as how it enters the house. This means a house must be tight, because in a loose house it is very difficult to control anything. This is true whether we are talking about the hottest day of the year with market age birds or the coldest day of the year with day-old-chicks.

During hot weather it is crucial that we bring in large quantities of fresh air to help rid the house of the tremendous amount of heat the birds are producing as well as the heat entering the house through the ceiling and side walls. Equally as important is the fact that in tunnel-ventilated houses with evaporative cooling pads all the air brought into the house by the exhaust fans must enter through the evaporative cooling pads. This is because any hot outside air entering the house through cracks in the side walls and ceiling dilutes the cold air entering through the pads before it can make it to the fan end of the house leading to increased house air temperatures.

During cold weather we want to bring in just enough fresh outside air to maintain proper air quality but not so much that fuel costs get out of control. In loose houses outside winds tend to push more air into the house than is usually needed, increasing heating costs. Furthermore, the cold air entering through cracks in the sidewall tends to drop to the floor before ever having an opportunity to mix with the hot air next to the ceiling causing drafts and leaving moisture in the litter which leads to caking.

This past summer a study was conducted on a broiler farm to demonstrate how house tightness affects air temperatures during hot weather in houses with evaporative cooling pads. The study was conducted on a farm with two, very loose 40' X 400' broiler houses. The amount of leakage was estimated by conducting a static pressure test. The side wall and tunnel inlets were closed, then one 48" fan was turned on and the static pressure was measured. The static pressure created by the one 48" fan was found to be approximately 0.03" in both houses, indicating that there was well over 20 square feet of leakage in each house (see *Poultry Housing Tips: Reducing Broiler House Heating Costs*, January 1997). The houses were then examined and the primary sources of the leakage were determined



Figure 1. Polyurethane foam sealant

to be gaps around the boards in between the trusses on the side wall and cracks along the ridge of the house.

The area between the trusses at the top of the side walls as well as the ridge were treated in one of the houses with approximately a two foot swath of 1 ½ inch commercially applied polyurethane foam sealant. The foam did an excellent job of tightening the house as demonstrated by the fact that the static pressure increased to 0.18" with one 48" fan operating. Leakage was estimated to be reduced from in excess of 20 square feet to less than five square feet in the treated house. During the warm summer months the reduction in leakage in the spray foamed house led to an average three degree lower air temperature at the fan end as compared to the fan end of the house in which the leaks were not sealed.

The study was continued this fall to see what effect reduced air leakage would have on heating costs during cooler weather. Fuel usage was monitored during a flock which was placed the last week of September and caught for processing the third week of November. **The total fuel usage in the untreated house was 720 gallons while fuel usage in the house sealed with Polyurethane was 540 gallons, about a 30% difference. If we were to assume an annual average fuel cost of \$3,500 this producer will save over \$1,000 per house by making this decision to seal the cracks in his houses.** With the fuel savings in the winter and cooler houses during the summer, there is little doubt that growers with loose houses can significantly increase their profits by improving house tightness.

Admittedly, this farm was a fairly extreme example, but it reinforces the fact that one of the keys to improving efficiency for many poultry producers is to make their houses tighter. Poultry producers with minor house tightness deficiencies probably do not need a commercial outfit come out and spray foam their houses. In many cases all that is required is a dozen or so cans of spray foam insulation and some plastic sheeting or curtain material. For instance, on a second farm in the same area a grower had four houses which to begin with were significantly tighter than those mentioned above but still had room for improvement. With one 48" fan the producer could obtain a static pressure of 0.08" which was not quite high enough to get the inlet machine, which was set at 0.05" (low limit) to 0.10" (high limit), to open the side wall inlets.



Figure 2. Can of spray foam with special applicator head

This meant that if the grower wanted to bring in some of the air through the side wall inlets, he would have to use both a 36" fan and a 48" for minimum ventilation. Yes, he could have lowered the upper limit on inlet machine down to 0.05" but then the cold outside air would have not entered with sufficient speed and would have quickly dropped to the floor.

The houses were examined to determine source of the air leakage. A number of cracks were found in the side wall as well as at the plate at the top of the side wall. These were sealed with a few cans of polyurethane foam. The shutters on the slant wall exhaust fans were also found to be a source of significant air leakage. To solve this problem shutters were removed from five of the eight fans, a piece of plastic slightly larger than the shutter was placed over the openings, and the shutters were replaced (Figure 3). After these steps were taken the static pressure with one 48" fan operating increased to a 0.15". This grower is now able to use a single 48" fan for minimum ventilation and the side wall inlets open perfectly. This will not only decrease his heating costs, but when he ventilates, more of the fresh air

that the 48" fan is bringing in will enter through the side wall inlets and thus be directed toward the ceiling where it will help move the warm air located there back down to the birds reducing drafts and promoting litter drying. The cost of tightening the four houses on this farm was less than \$200.

Anyone that has worked with small cans of spray foam in the past knows that it can be a rather messy job. With many products it is difficult to control the amount of foam you are spraying which leads to large “blobs” of insulation when only a small bead is needed to seal the crack. You end up spending a lot more money on the spray foam insulation than what is really needed and the house ends up looking fairly rough. There are some new spray foam products that are available that make the job of sealing cracks much easier and in the long run significantly cheaper. The cans come with a special applicator that makes it very easy to put down an 1/8" bead of foam to 1" bead or anything in between (See Figure 1 & 2). Since you can better control the amount of foam you are applying, a can of foam goes at least twice as far those without the special applicator head. When the can is empty you remove the applicator head and place it on a new can of spray foam and away you go.

You can often reduce the cost of sealing a house by purchasing spray foam in gallon size containers. These containers often come with the specialized applicator heads mentioned above which allows more precise control of the size of bead generated.

If your broiler houses are extremely loose, consider contacting a professional spray foam insulating contractor. The cost of having the top of the side walls and the roof ridge sealed was estimated at approximately \$1,500 for the 400' house used in our study.



Figure 3. Plastic sheeting over fan shutter

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